

DEPARTMENT OF VETERANS AFFAIRS

DESIGN INSTRUCTIONS TO ARCHITECTS AND ENGINEERS

LOCATION :

PROJECT TITLE :

PROJECT NO. :

[] SCHEMATICS [] DESIGN DEVELOPMENT [] CONSTRUCTION DOCUMENTS

AUTOMATIC TRANSPORT

TRANSPORT SYSTEMS (ELEVATORS) DESIGN MANUAL FOR:

[] HOSPITAL

[] AMBULATORY CARE

[] DOMICILIARY

[] NURSING HOME

[] OUTPATIENT CLINIC

FROM:

DATE:

Package Preparer:

Telephone Number:

**DEPARTMENT OF VETERANS AFFAIRS
TRANSPORT SYSTEMS (ELEVATORS) DESIGN MANUAL**

TABLE-OF-CONTENTS

1.	Criteria Unique to VA-----	5
2.	General-----	5
3.	Elevators-----	5
4.	Size and Number of Elevators-----	7
5.	Guidelines-----	8
6.	Power Door Operation-----	10
7.	Handicapped Provisions-----	10
8.	Elevator Hoistways-----	10
9.	Elevator Pits-----	11
10.	Elevator Machine Rooms-----	11
11.	Basic Electrical Notes-----	12
12.	Venting and Automatic Damper of Hoistway Venting-----	14
13.	Drawings-----	14
14.	Transport Systems Standard Details Index-----	15
15.	Applicable Transport Systems Master Specifications Index-----	15
16.	Elevator Electrical Specification-----	16

**TRANSPORT SYSTEMS (ELEVATORS) DESIGN MANUAL
DEPARTMENT OF VETERANS AFFAIRS**

1. CRITERIA UNIQUE TO VA:

- 1.1 Curved hoistway door jamb.
- 1.2 Solid grouting of door jamb.
- 1.3 Two emergency stop switches in every elevator pit.
- 1.4 Hydraulic elevator:
 - A. Automatic shut-off valve located next to piston jack head.
 - B. Oil line gate shut-off valve located in pit and machine room.
 - C. Oil return scavenger pump located in pit.
- 1.5 Hoistway lighting.
- 1.6 Motorized hoistway louvered venting activated by top of hoistway smoke detector.
- 1.7 Provide smoke detectors at top of the hoistways. The detectors shall operate hoistway venting and alarms as per Hoistway Venting System Design Criteria.

2. GENERAL:

- 2.1 The transportation equipment for new facilities shall be included in the general contract with specification sections prepared for the transport systems as required. These specification sections are included in the master specifications.
- 2.2 The requirements of the latest edition of the ASME A17.1 Safety Code for Elevators and Escalators, National Electrical Code (NEC), International Building Code (IBC), constitutes the minimum requirements of all transportation systems, including design, methods of construction, manner of installation, and tests. All equipment will meet the requirements of the Uniform Federal Accessibility Standards (UFAS), American Disabilities Act, for architectural barrier free requirements.

3. ELEVATORS:

- 3.1 Passenger elevators are used to transport the public, hospital staff, ambulatory and wheel chair patients.

- 3.2 Hospital service elevators are used to transport employees, patients, and equipment or carts. Patients may be on foot, in wheelchairs, on gurneys or beds.
- 3.3 Combination passenger and service elevators are installed where combined use is possible without interfering with normal activities, i.e., outpatient, domiciliary, and nursing home care facilities.
- 3.4 Elevators shall be provided in all facilities having two or more floors and shall be designed for the type of traffic anticipated. Passenger and service elevators shall be sized to accommodate handicapped persons.
- 3.5 Elevators for limited special use, such as those for private passengers, are economically undesirable. They shall not be installed unless they can be fully justified. The use of slow speed elevators shall be considered and separated from other traffic if required for mortuary use or the transport of animals.
- 3.6 When planning the location of elevators, the following principles shall be observed:
 - A. Elevators shall be located so that the building entrances with the heaviest traffic will have adequate elevator service. Elevators shall be as near to the center of the building as practical, taking into consideration the distance from the elevators to the most distant patient care areas.
 - B. Elevators shall be located to serve all floors that require service. This includes the basement, sub-basement, overhead mechanical spaces as well as all of the typical floors of the building. Avoid placing elevators or dumbwaiters over occupied spaces as this will require counterweight safeties and reinforced pits.
 - C. Elevators shall be grouped in banks of adjacent cars or banks of cars facing each other. It is desirable not to have over three service cars in a bank or three passenger cars in a bank, and not over six cars in a group of two facing banks.
 - D. Consideration shall be given to the maximum walking distance from the elevators to the most distant patient care areas. This factor shall be weighed along with the advantages of locating elevators near the center of the building and the advantage of elevator clustering. In general, the maximum walking distance to elevators should not exceed 60 m (200 ft). Decentralized elevators should be planned to include at least two cars to maintain an acceptable dispatch interval and insure continuity of service.
 - E. The lobby width between two banks of passenger elevators shall be not less than 3.6 m (12 ft). Service elevator lobbies shall not be less than 4.2 m (14 ft).

4. SIZE AND NUMBER OF ELEVATORS:

- 4.1 Size and number of elevators required for a given building depends upon the size and function of the building, activities in it, density of population, the physical location and grouping of elevators, etc. The overall annual cost of the transport systems, including amortized costs of the original investment, cost of maintenance, material, and consumed power shall be considered.
- 4.2 The following primary functions shall be used for the purpose of estimating the elevator requirements:
- A. The anticipated population density figures shall be provided by the Department of Veterans Affairs to assist in the system design. However, in all cases, the vertical transportation requirements shall be planned for the total population that the facility could reasonably house, rather than a forecast of initial occupancy.
 - B. Maximum traffic peak. This is the maximum percentage of the total population on the floors served by the elevators that must be handled during any 5 minute period. This maximum traffic peak will vary with the type of functional areas and special conditions applicable to the facility. In general, the maximum traffic peak shall be considered as being up peak by the 24 hourly summaries, i.e., based on elevator loading at the lower main terminal, or terminals, local discharge of passengers on the up trip and express runback to the lowest main terminal.
 - C. The computations for vertical transportation equipment shall be based on transporting 10 to 14 percent of those persons who move between floors during periods of maximum demand in five minutes. The peak values, together with the population density factor should provide a reserve capacity adequate to maintain reasonable satisfactory service during periods when one elevator is shut down for repairs.
 - D. The possibility of changes in the type of occupancy and reassignment of building areas that would result in a greater volume of traffic shall be investigated. When such possibilities exist, the building framing shall be arranged to permit future installation of such additional elevator equipment as will be required to handle future possible increase in traffic volume.
 - E. Special conditions which must receive consideration in estimating elevator requirements include cafeteria traffic, canteen store traffic, dietary distribution and retrieval, transient traffic, visitor traffic, outpatient traffic, pharmacy, building management, SPD, surgery warehousing, spinal cord injury, grouping of elevators, external transport facilities, building entrances at more than one level, basement facilities, unusual inter-floor traffic requirements, and trash removal if chutes are not used.

- F. Where groups of elevators serving identical floors are required in two or more locations for the purpose of providing reasonable convenience of use, the elevators shall provide a minimum carrying capacity of not less than 120 percent of the maximum traffic peak.
- G. Passenger and service elevators shall be capable of handle their maximum peak loads while providing satisfactory interval of service. Consider the following:
 - 1. A capacity and speed shall be selected that will require the least number of elevators to handle the peak loads with an acceptable interval. Passenger elevators in a group shall have no greater than 45 second intervals. Service elevators in a group shall have an interval of 60 seconds maximum. For passenger elevators, except special outpatient elevators or other special purpose elevators, the car capacity shall be 1815 kg (4,000 lb). When separate service elevators are provided, they shall be a minimum of 2270 kg (5,000 lb) capacity.
 - 2. Where one elevator would normally meet the requirements in the facility where patient elevator service is essential, facilities over 2 stories high shall have two elevators installed to insure continuity of service.

5. GUIDELINES:

- 5.1 The equipment specified shall depend upon the service demand and the equipment commercially available to meet those demands.

- A. Geared or gearless hoisting machines shall be used for elevators in buildings of eight floors or less. Only gearless machines shall be used for elevators in all buildings nine floors or more. The placing of hoisting machines in basement machine rooms or in machine rooms adjacent to the hoistway shall be limited to special cases where conditions do not permit the installation of overhead machines.
 - 1. Single wrap geared traction configuration may be used for speeds up to 1.75 m/s (350 fpm).
 - 2. Single wrap gearless traction configuration may be used for speeds up to 2.03 m/s (400 fpm). Roped 2:1 with secondary sheaves.
 - 3. Double wrap gearless traction configuration shall be used with speeds of 2.5 m/s (500 fpm) and greater. Roping shall be 2:1.
- B. Microprocessor Control System with VVVF AC Regenerative Drive shall be used on all electric traction elevators. Controllers shall be non-proprietary and proprietary tools shall not be necessary for adjustments or maintenance. The controller vendor shall provide technical support to the VA Medical Center's designated Elevator Maintenance Service Provider.

- C. Oil hydraulic direct plunger elevators will be considered for limited rises up to four stops, 12.2 m (40 ft) with a rated speed of 0.63 m/s (125 fpm). Microprocessor Control System with Electronic Motor Starter shall be used on all hydraulic elevators. Do not use Wye-Delta or across the line starters.
- D. Operations: In general, the following systems of operation shall be provided for elevators:
 - 1. Single car selective collective operation.
 - 2. A two car bank of elevators shall have duplex selective collective automatic operation.
 - 3. A bank of three or more elevators shall have group automatic operation with automatic selection of method of dispatching.
 - a. For a group of three or more elevators include zone dispatching system.
- E. Special circuits, special control and emergency requirements should be anticipated. Possible areas for such consideration are surgery, intensive care, cardiac emergency, emergency receiving and dietary usage. Medical emergency service may be required.
- F. Elevator capacity and platform design:
 - 1. Passenger elevators 1818 kg (4,000 lb) capacity and 2432 mm (8ft) wide by 1880 mm (6ft 2in) deep platform not to exceed 3.92 square meters (42.2 square feet) inside net platform area.
 - 2. Service elevators 1818 kg (4,000 lb) capacity and 1829 mm (6ft) wide by 2641 mm (8ft 8in) deep platform not to exceed 3.92 square meters (42.2 square feet) inside net platform area.
 - 3. Service elevators 2273 kg (5,000 lb) capacity and 2032 mm (6ft 8in) wide by 2641 mm (8ft 8in) deep platform not to exceed 4.65 square meters (50 square feet) inside net platform area.
 - 4. Bariatric elevators, when required, shall be a minimum of 2727kg (6,000 lb) capacity.
- G. Maximum size of vehicles or other loads, and maximum weight of portable medical or X-ray equipment should be determined before setting elevator size and capacities. Maximum area allowed by the ASME A17.1 Code shall be used to develop inside dimensions of car enclosure.
- H. Elevator cars: Car enclosures shall be front entrance or front and rear entrance and shall be of standard design unless modifications are dictated due to special project conditions.

Cab designs shall be detailed on the architectural drawings. Materials for elevator cabs shall be selected so the car enclosure conforms to ASME A17.1 and the specifications.

I. Entrances - Passenger, Service and Freight Elevators:

1. Doors shall be single speed center opening or two speed side slide. Do not use two speed center opening doors.
2. Passenger elevator entrance width: 1220 mm (4 ft) standard.
3. Service elevator entrance width: 1220 mm (4 ft) standard - 1523 mm (5 ft) optional if required by facilities function.
4. Door opening height: 2133 mm (7 ft).
5. Freight elevators: Hoistway and car bi-parting doors shall be power operated. Opening size determined by facilities function.

6. POWER DOOR OPERATION:

6.1 Power door operation shall be provided for all elevators.

- A. Door operator shall be capable of opening doors at the rate of 0.75 m/s (2.5 fps). This is a capability speed, with actual speed being adjusted to meet requirements of the specific installation.
- B. Closing speed shall be 0.3 m/s (1 fps). All power operated doors shall be equipped with an automatic reopen device for passenger protection. Do not activate door nudging. Use audio voice announcement, "please stand clear of the doors", and activate the nudging buzzer.

7. HANDICAPPED PROVISIONS:

7.1 Provide as per the requirements of ASME A17.1 and The Americans with Disabilities Act of 1990 (ADA).

8. ELEVATOR HOISTWAYS:

8.1 All hoistways shall comply with ASME A17.1. Structural supports shall be provided at each floor and where conditions require it between floors for securing guiderail brackets. Provide either intermediate supports between floors or general brackets where the distance between floors or structural supports exceeds 4.2 m (14 ft) or as needed by seismic requirements. All additional supports for guide rails shall be shown on structural drawings and shall be included as part of the structural framing of the hospital.

- 8.2 The interior face of the hoistway walls shall have a smooth, flush, light colored surface. Exposed spray-on fire proofing shall not be used in the elevator hoistway.
- 8.3 Hoistway sizes of elevators with their overhead and pit clearances are shown on VA's construction details sheets. These clearances are based on probable car structures and heights of commercially obtainable equipment together with runby and clearance requirements of ASME A17.1.

9. ELEVATOR PITS:

- 9.1 Pit depths shall meet the requirements of ASME A17.1. Provide two stop switches in the pit, 1220 mm (48 inches) above the bottom landing at the top of the pit ladder and 1220 mm (48 inches) above the pit floor adjacent to the pit ladder.
- 9.2 Pits shall be provided with a fixed vertical steel access ladder for each elevator. The ladder shall be located within reach of the elevator hoistway entrance door unlocking device (ASME A17.1) at the bottom landing and clear all elevator equipment.
- 9.3 Pits 2440 mm (8 ft) and deeper shall be provided with a permanent means of external access. Where external access is impractical a permanent ladder accessible from the bottom hoistway entrance door shall be provided in each pit in accordance with ASME A17.1. The external access shall be carefully studied before it is declared impractical.
- 9.4 Door to pit space shall be of fire resistant construction and shall be provided with self closing, self locking hardware, and arranged so that a key is required for entry. Indicate sign on door as per ASME A17.1.
- 9.5 Sump pits shall be avoided unless a water problem exists. If sump pits are required, provide a pit with a removable grate. A portable sump pump shall be used to pump pits. Sump pumps shall not be connected to the sewer system.

10. ELEVATOR MACHINE ROOMS:

- 10.1 Elevator machine rooms shall be large enough to install the elevator equipment, including space for controllers. Clearances for control equipment shall be not less than that required by the National Electrical Code, and with enough working space between the various items of equipment for maintenance purposes. It must be possible to remove major equipment components of each elevator for repair without dismantling components of an adjacent elevator. Minimum headroom shall be 2440 mm (8ft).
- 10.2 Elevator machine rooms shall be of fire resistant construction equivalent to hoistway construction. The machine room side of floors, ceilings, and walls shall have a smooth surface. Exposed spray on fireproofing shall not be used in elevator machine room.

Walls, ceilings and floor shall be painted a light color. Floors shall be sealed to eliminate concrete dust.

- 10.3 All openings in the floor for passage of hoist ropes, etc. shall have 50 mm (2 in) high metal sleeves.
- 10.4 Elevator machine rooms access doors shall conform to ASME A17.1.
- 10.5 Industrial stairs shall be provided for access to machine rooms. Access to machine rooms should preferably not require passage across a roof or similar exposed area.
- 10.6 Geared or gearless machines shall be mounted on vibration and sound isolating pedestal base with deflector sheave mounted in the base. These isolating devices, when required, shall be designed to conform to seismic design requirements.
- 10.7 Skylights shall not be installed in elevator machine rooms.
- 10.8 Provide air conditioning, heating, and ventilation in machine rooms that meets the requirements of the elevator equipment manufacturer.
- 10.9 Lighting shall be provided to insure proper illumination in the front and rear of all controllers, supervisory panels and over each hoisting machine.

11. BASIC ELECTRICAL NOTES:

11.1 POWER SUPPLY:

A. Main Power:

- 1. Each elevator shall be provided with a separate three phase power supply through a shunt trip circuit breaker and surge suppressor located in the respective machine room, adjacent to the entry and with clear access. The supply should terminate at the respective elevator controller. Indicate the design electrical loads; (horsepower, voltage, amperage, etc.) switch sizes, breaker settings, wire sizes and conduit sizes.
- 2. The elevator power supply shall be a dedicated main feeder utilizing the shortest practical run and continuous ground conductor.

B. Auxiliary Power:

- 1. The elevators shall have auxiliary power available with the capacity to operate a minimum of one elevator per group at a time.
- 2. If emergency generator is not available, traction elevators shall be provided with an auxiliary power system that will run the elevator to the nearest floor, open the doors, and maintain an energized door open button.

3. If emergency generator is not available, hydraulic elevators shall be provided with an emergency lowering system to lower the elevator to the bottom floor, open the doors, and maintain an energized door open button.

C. Ground-Fault Circuit-Interrupter Protection for Personnel (GFCI):

1. Each elevator machine room shall be provided with a minimum of one GFCI receptacle per elevator.
2. Each elevator pit shall be provided with one GFCI receptacle per elevator.
3. Provide for hydraulic elevators, a GFCI receptacle in the pit.

11.2 COMMUNICATION:

- A. Each elevator shall be equipped with a Hands Free Telephone located in the auxiliary car operating panel.
- B. Conduit and wire shall be provided from the elevator machine room to a 24 hour monitoring location.

11.3 FIRE ALARM INITIATING DEVICES:

- A. Fire Alarm Initiating Devices shall be installed in elevator lobbies, top of hoistways, elevator machine rooms and conform to the requirements of ASME A17.1, NFPA 72, and IBC.

11.4 HEAT DETECTORS and SPRINKLER HEADS:

- A. Meet the requirements of IBC, NFPA 13, and ASME A17.1.

11.5 MACHINE ROOM APPLIANCE PANEL:

- A. Provide a circuit breaker panel capable of locking the disconnecting means in the off position in each machine room. The panel shall contain:
 1. A separate emergency power circuit to supply 120 Volts to each elevator for fan, lights, and alarm.
 2. A separate circuit for the machine room lights.
 3. A separate circuit for the machine room GFCI receptacles.
 4. A separate circuit for the hoistway lights.
 5. A separate circuit for hoistway GFCI receptacles.
 6. Each hydraulic elevator shall be provided with a separate circuit for the scavenger pump in the pit.

7. Provide fluorescent lighting fixtures in the elevator hoistway. The lights are to be stacked vertically in a back corner wall for a single elevator or on the back wall between the divider beams of a duplex or triplex installation. The extreme top and bottom fixtures shall be mounted to illuminate the pit area when the car is at the bottom landing and the car top when the car is at the top landing. A three way light switch is to be provided at the top of the pit ladder and five feet above the top terminal landing at the inside front wall near the hall button box.

12. HOISTWAY VENTING FOR VA ELEVATORS:

- 12.1 The VA and International Building Code require that all elevator hoistways that penetrate more than four floors shall be vented to prevent accumulation of hot gases and smoke inside the hoistway. This requirement includes non-personnel elevators if equipped with the means for top of car operation by service personnel.
- 12.2 The required vent shall be controlled by a motorized louver that is powered closed. This louver shall open upon loss of electrical power or by a signal from a smoke detector activated at the top of the elevator hoistway.

13. DRAWINGS:

- 13.1 Separate architectural drawings shall be prepared for the transport systems. Elevator drawings shall show electrical services, materials, sizes, details, space conditions, etc., of hoistway enclosures, pits, cabs, entrances, machine rooms, and other features. These elevator drawings shall be coordinated with the other architectural, structural, mechanical and electrical drawings to insure that proper space conditions and other requirements have been provided.
- 13.2 The spaces shall be designed so that they will accommodate the largest elevator equipment. The transport system drawings shall be prepared and designed so that no manufacturer is prevented from bidding on the work.
- 13.3 Architectural drawings shall show reactions at point of elevator machine beams, and car and counterweights buffer supports. Indicate impact loads.
- 13.4 Architectural drawings shall show elevator rail bracket spacing and maximum horizontal and vertical forces on guide rails.
- 13.5 Dumbwaiter hoistway entrance details shall be shown complete with doors. The top and bottom entrances shall be provided with hoistway access. Provide permanent access to overhead machine spaces. Provide an access door and industrial stair into machine space or room.

14. TRANSPORT SYSTEMS STANDARD DETAILS INDEX:

Details not provided as a hard copy with the A/E Package shall be available at the first review. Details are provided in VA Program Guide PG-18-4 and ARCHITECTURAL STANDARD DETAILS.

<u>DETAIL</u>	<u>DATE</u>	<u>TITLE</u>
SD142100-01	2008	Hoistway Details - Elevator Electric Traction Passenger Two Speed Sliding Doors - 4,000 lb Capacity
SD142100-02	2008	Entrance Details - Service and Passenger Electric Traction or Hydraulic Elevator Two Speed Side Sliding Doors
SD142100-03	2008	Elevator - Service Horizontal Sliding Center Opening Doors - 5,000 lb Capacity
SD142100-04	2008	Entrance Details - Service and Passenger Electric Traction or Hydraulic Elevator Horizontal Sliding Center Opening Doors
SD142100-05	2008	Elevator Hoistways - Passenger Elevators Vertical Dimensions - 4,000 lb Capacity
SD142100-06	2008	Elevator Hoistways - Service and Passenger Vertical Dimensions - 5,000 lb Capacity
SD142100-07	2008	Elevator - Passenger Horizontal Sliding Center Opening Doors
SD142100-08	2008	Entrance Details - Service and Passenger Electric Traction or Hydraulic Elevators Horizontal Sliding Center Opening Doors with Drywall Shaft
SD142400-01	2008	Hydraulic Elevator - Plan and Section

15. APPLICABLE TRANSPORT SYSTEMS MASTER SPECIFICATIONS INDEX: Use latest edition.

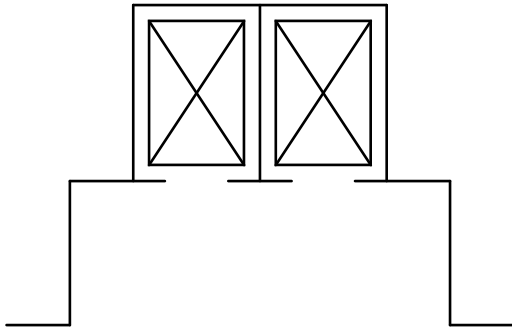
<u>SECTION</u>	<u>TITLE</u>
14 12 11	Dumbwaiters - Drum Type
14 12 21	Dumbwaiters - Geared Traction
14 21 00	Traction Elevators
14 21 11	Non-personnel Traction Elevator
14 24 00	Hydraulic Elevators
14 24 11	Non-personnel Hydraulic Elevator

14 91 82	Gravity Trash Chute
14 91 33	Gravity Linen Chute

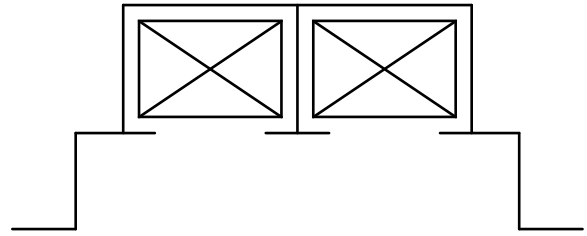
16. ELEVATOR ELECTRICAL SPECIFICATIONS:

<u>SECTION</u>	<u>TITLE</u>
26 05 11	Requirements for Electrical Installations
26 05 33	Conduit Systems
26 05 21	Cables, Low Voltage (600 volts and below)
26 27 26	Wiring Devices
26 24 16	Panel Boards
26 29 21	Disconnect Switches (motor and circuit)
26 05 26	Grounding

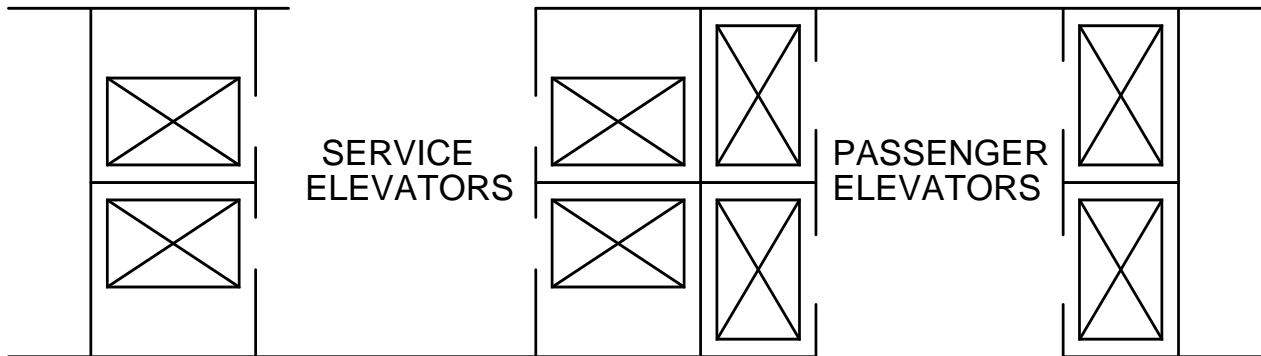
--End--

DOA.

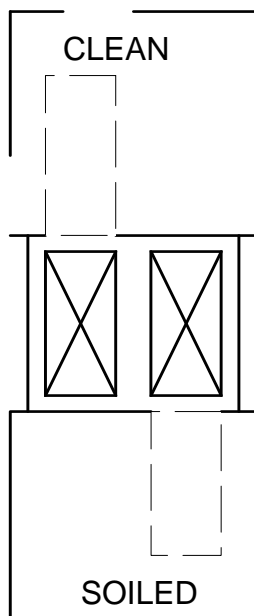
SET SERVICE ELEVATORS BACK
1800 mm (6 FT.) FROM CORRIDOR LINE

B.

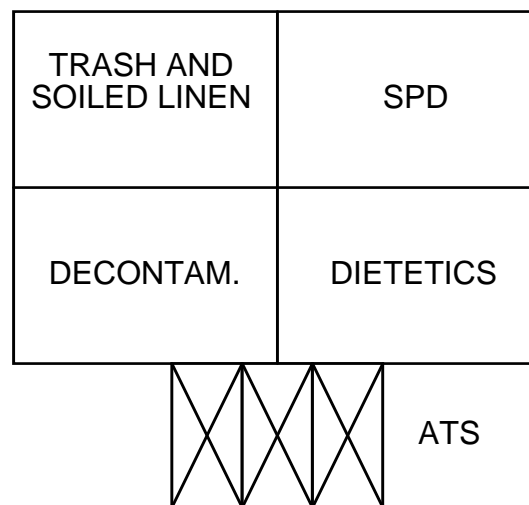
SET PASSENGER ELEVATORS BACK
600 mm (2 FT.) FROM CORRIDOR LINE

C.

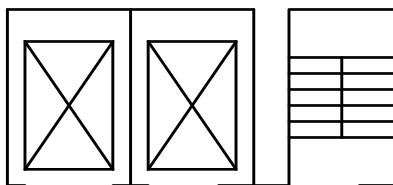
-
- a. PROVIDE POSITIVE SEPARATION OF PASSENGER & SERVICE TRAFFIC
 - b. PROVIDE 4.2 m (14 FT.) MIN. WIDTH SERVICE ELEVATOR LOBBIES
 - c. PROVIDE 3.6 m (12 FT.) MIN. WIDTH PASSENGER ELEVATOR LOBBIES

DOD.

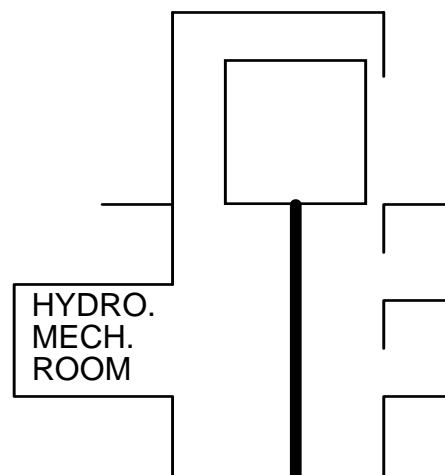
PROVIDE SEPARATE CLEAN
AND SOILED FACILITIES FOR
AUTOMATIC TRANSPORTS (ATS)

E.

CONSIDER PROXIMITY LOCATION
OF FUNCTIONS USING AUTOMATIC
TRANSPORT SYSTEMS IN ORDER
TO MINIMIZE HORIZONTAL TRAVEL
AND MIXING OF SOILED AND
CLEAN TRAFFIC

F.

PROVIDE STAIRS ADJACENT
TO PASSENGER AND SERVICE
ELEVATOR LOBBIES

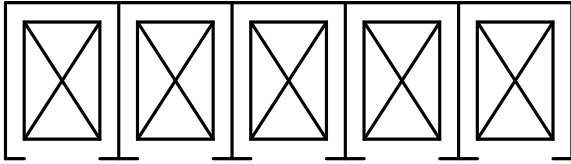
G.

CONSIDER HYDRAULIC ELEVATORS
WHEN FUTURE FLOORS ARE TO
BE INCLUDED IN DESIGN

H. CONSIDER HORIZONTAL TRAFFIC FLOW FROM ALL ENTRANCES AND HEALTH CARE TRAFFIC GENERATORS BEFORE DECIDING BETWEEN CENTRALIZED OR DECENTRALIZED VERTICAL TRANSPORTATION SYSTEMS.

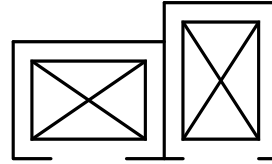
DO NOT

A.



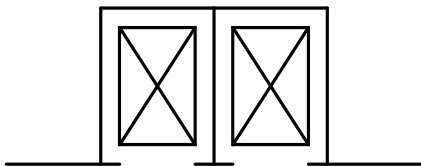
PLACE 4 OR MORE ELEVATORS
IN A STRAIGHT LINE

B.



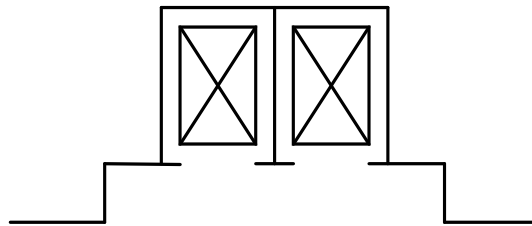
MIX TYPES OF
ELEVATORS

C.



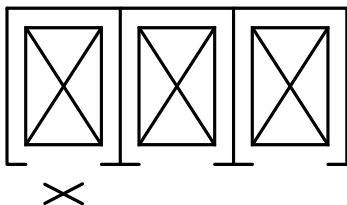
PLACE ELEVATOR OR
DUMBWAITER OPENINGS
ON CORRIDOR LINE

D.



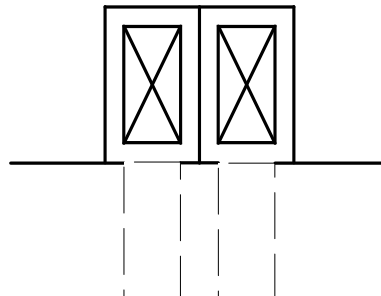
LOCATE ELEVATOR LOBBIES ON
MAIN THOROUGHFARE CORE

E.



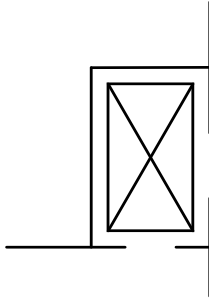
LOCATE DEDICATED (SERV./FRT.)
ELEVATOR WITH PUBLIC (PASS.)
USE ELEVATORS

F.

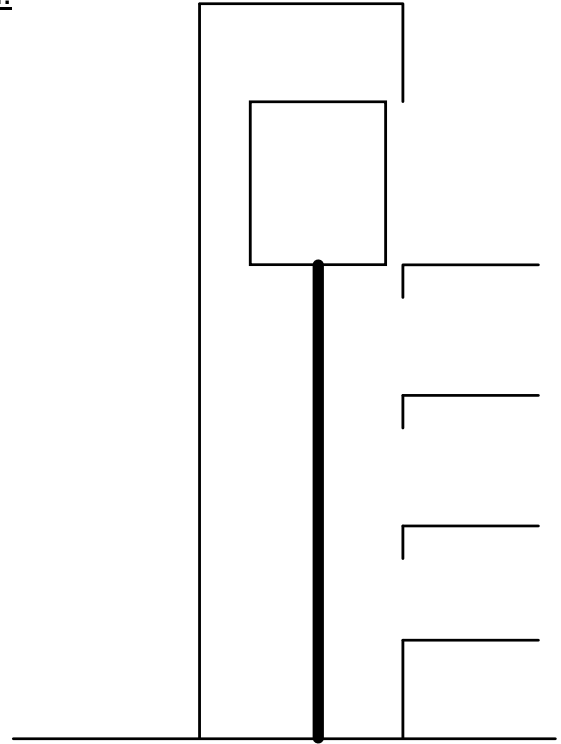


LOCATE AUTOMATIC MATERIAL
LIFTS IN PUBLIC AREAS

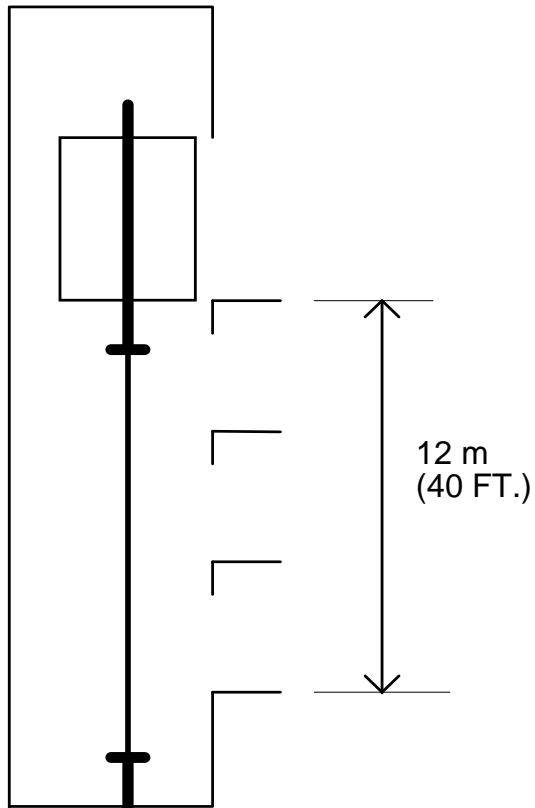
DO NOT

G.

DESIGN ELEVATORS WITH
FRONT AND SIDE OPENINGS

H.

LOCATE ELEVATORS OVER
OCCUPIED AREAS

I.

EXCEED 12 m (40 FT.) OF TRAVEL
FOR HYDRAULIC ELEVATORS